FAT-Pointer based range addresses

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The gap between application workloads and capacity of TLB is on the rise. Previous work exploits this by physically contiguous memory. Capability-based addressing in the CHERI architecture is designed to improve hardware-level system security. These security mechanisms designed in place can also behave as accelerators to standard user-space memory allocators. The property of CHERI which is to use FAT-Pointers to store the upper and lower bounds can also be represented as ranges of memory addresses which are physically contiguous. <Talking about the results>.

CCS Concepts: • **Do Not Use This Code → Generate the Correct Terms for Your Paper**; *Generate the Correct Terms for Your Paper*; Generate the Correct Terms for Your Paper; Generate the Correct Terms for Your Paper.

Additional Key Words and Phrases: Do, Not, Us, This, Code, Put, the, Correct, Terms, for, Your, Paper

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1 RELATED WORK

1.1 Huge Pages

This is used to map a very large region of memory to a single entry. This small/large region of memory is physically contiguous. Most implementations of huge pages are size aligned, For example for the x86 architecture the huge pages size are 4KB, 2MB and 1GB pages.

1.2 TLB coalescing

This leverages the default OS allocator behavior to pack multiple PTEs into a single TLB entry.

1.3 Segment

A segment can be viewed as mapping between contiguous virtual memory and contiguous physical memory. The property of a segment allows it to be larger than a page. Direct Segment <paper reference> allows the user to set a single segment for an application. Two registers are added to mark the start and end of the segment. Any virtual address within this region can be translated by adding the fixed offset between the virtual and physical address.

1.4 RMM

RMM introduces the concept of adding an additional range table. For large allocations RMM eagerly allocates contiguous physical pages. The following allocations creates large memory ranges that are both virtually and physically contiguous. RMM builds on the concept of Direct segment <paper reference> by adding offset to translate a virtual address to physical address. RMM compares

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address with range boundaries to decide which range it belongs to. RMM queries the range table ofter an L1 TLB miss.

1.5 FlexPointer

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